REMARKS

Status of Claims

Claims 20-27 were pending in the application.

Claim Rejections - 35 U.S.C. § 103

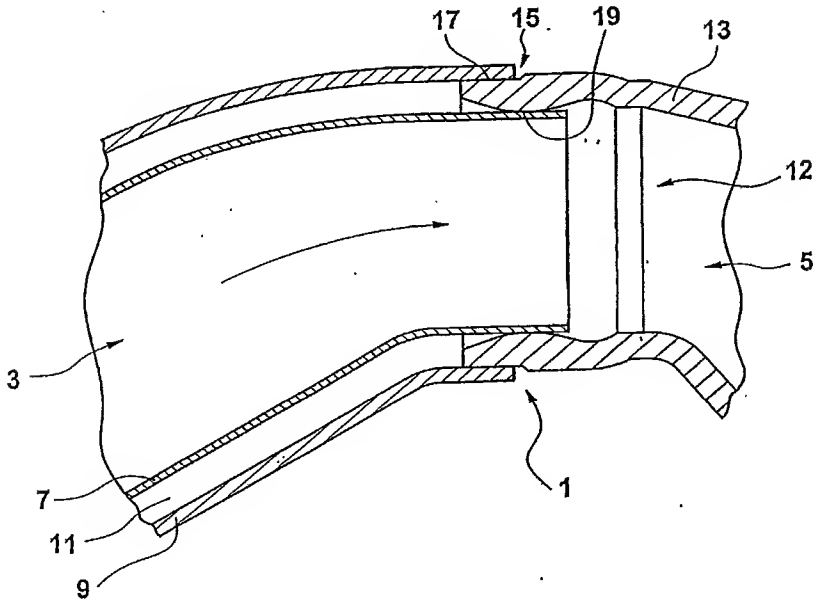
Claims 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art on pages 1-2 in the instant specification, AAPA, in view of Combs 4,138,986 and Mitsui et al 5,521,353 further in view of DE 20000150158, submitted by Applicant.

Applicant respectfully traverses.

The references read in combination to not teach or suggest

- sliding the ***outer shell*** (9) of the airgap-insulated exhaust manifold (3) over the ***outside*** of the turbocharger opening (12) while introducing the ***inner pipe*** (7) ***into the port*** (12) of the housing (13) of the turbocharger, such that the turbocharger inlet port opening (12) is located between the inner gas-carrying pipe (7) and outer sheet-metal heat-insulating pipe (9) of the airgap-insulated exhaust manifold (3) (see Fig. 1), and then

- pulse-welding to join the at least one sheet metal outer pipe (9) and the inlet port (12).



*According to the Examiner, connecting a **cast** manifold via screws or welding is taught as conventional in the AAPA.*

This has no relevance to the present invention.

The instant claims define that a pulse welding is used to connect the dissimilar metals. Use of laser, TIG, MIG is claimed.

Applicants point out that it is not merely a question of welding dissimilar metals, but rather welding the ***outer shell*** (9) of the airgap-insulated exhaust manifold (3) over the ***outside*** of the turbocharger opening (12) while introducing the ***inner pipe*** (7) ***into the port*** (12) of the housing (13) of the turbocharger.

Given the danger of exhaust gas leakage into a passenger compartment of an automobile or bus, exhaust pipes were conventionally joined to housings using a seal. The present joining technique is revolutionary. The inner pipe of the airgap-insulated exhaust pipe is not welded or joined in any way. Only the outer pipe of the airgap-insulated exhaust pipe is joined by welding.

What reference teaches that such a technique will reliably contain exhaust gas and safely prevent leakage of exhaust gas into the passenger cabin of an automotive vehicle?

Even if some suggestion could be found in the references to TRY this novel technique, it must be remembered that "obvious to try" a new joining technique is not the test. The invention is not made until an attempt has been made to join an airgap-insulated exhaust pipe to a cast metal housing of a turbocharger by inserting the inner gas carrying pipe into the inlet of the turbocharger while sliding the outer heat-insulating sheet-metal pipe around the outside of the turbocharger inlet, and welding the sheet metal tube to the turbocharger casting, and then verifying that a gas tight seal can be formed by this new method, this new seal being able to survive repeated thermal cycling, with the sheet metal and cast pipe having differential coefficient of expansion, over an extended period of time.

The patent to Combs teaches connecting a cast manifold ring to a sheet metal connector pipe using welding. See column 8, lines 57-64, teaching that a cast article in a firebox is connected to sheet metal via welding. The use of pulse welding is not taught.

Again, this has almost no relevancy to joining an airgap-insulated exhaust pipe to a cast metal housing of a turbocharger by inserting the ***inner*** gas carrying pipe ***into the inlet*** of the turbocharger while sliding the ***outer*** heat-insulating sheet-metal pipe ***around the outside*** of the turbocharger inlet, and welding the sheet metal tube to the turbocharger casting.

Combs teaches that a cast iron ***firebox*** (15) (col. 7, lines 60-61) which may have a rolled steel ring (28) cast into the top of firebox (15) (col. 8, lines 57-60). The ***steel ring*** (28) may be welded to the cylindrical steel shell of heat exchanger (16)(col. 8, lines 59-60). Thus, Combs simply teaches that steel may be welded to steel, or, Combs at best teaches that to connect a sheet metal conduit to a cast iron body, the cast iron body must have a steel connecting element cast into place to which the sheet metal conduit can be welded. Combs does not teach welding an exhaust manifold directly to at least the port (12) of the exhaust assembly (5) manufactured from cast metal. Nowhere does Combs teach or suggest a method of claim 20 comprising introducing the inner pipe (7) into the port (12) of a cast turbocharger housing (13) and welding the outer sheet-metal heat-insulating part of the airgap insulated exhaust pipe to the inlet port of the turbocharger housing (12) by means of a pulse-welding method .

Thus, the AAPAs alone or read in combination with Combs have no suggestion to weld a sheet metal exhaust pipe to a cast iron port.

The use of pulse welding is not taught. In this respect the patent to Mitsui et al clearly teaches that welding of sheet metal with pulse welding is conventional. See paragraph 0026. Mitsui et al also mention in paragraph 31 that cast iron can also be welded. In view of this teaching it would have been obvious to connect the cast part in the prior art disclosed with a sheet metal connector using pulse welding, to produce a superior weld. Note that the Mitsui et al patent teaches that pulse welding can be successfully used to weld thin sheet metal, as claimed.

Applicants have carefully reviewed this reference and find therein no teaching that sheet metal can be welded to cast iron, and most importantly, that a sheet metal conduit can be welded to a cast iron turbocharger inlet port. The present specification goes into great length to explain the difficulty of forming such a welded connection, particularly with the high reliability and durability required of a conduit carrying exhaust gas under pressure, where leakage of exhaust gas could present a problem of poisoning of occupants of a motor vehicle.

Mitsui at best teaches: "The described method has been practiced with steel base thin sheets of material but it should be readily obvious that ***other materials may be welded*** using this technique ***such as cast iron*** or carbon steel which may require pre-heating and using the MAG welding technique or MIG welding aluminum or aluminum alloy sheets is also possible. The welding of metal having high thermal conductivity such as copper, brass, aluminum and magnesium is also possible as is the welding of stainless steel, ferrite-based alloys, alloys of the martensitic family or alloys of precipitation hardening. In addition, welding of titanium by TIG welding can also be performed." The person of ordinary skill would read this as simply teaching that metals may be joined to similar metals. There is no express teaching that metals may be welded to dissimilar metals, and the person of ordinary skill is well aware of the difficulties of forming such junctions, thus would find in this reference no such suggestion.

In conclusion, the cited references do not allow the person of ordinary skill to envision, or to expect success of, welding of a sheet metal pipe section to a cast exhaust outlet port. Considering the hazards attendant to failure of such a junction, the person of ordinary skill would not be lead by these references to make or foresee success of the present invention.

The reference to DE 158', disclosed above, is applied for evidencing that turbocharger parts can be welded to a housing using welding. Use of the above welding of any two dissimilar parts with pulse welding is obvious to the artisan to use for turbocharger construction.

In response Applicants request the Examiner to compare the above figure showing the present invention and the following figure taken from DE 158, from which it can be seen that DE 158 merely discloses a procedure for connecting an exhaust manifold with an opening of a housing of an exhaust assembly, with at least the opening of the exhaust assembly made of ***cast metal*** and wherein ***the exhaust manifold*** of the exhaust aggregates is ***introduced in the opening of the housing*** and is welded by a welding process. Nothing in these references would suggest welding an airgap-insulated exhaust pipe to a cast metal housing of a turbocharger by inserting the inner gas carrying pipe into the inlet of the turbocharger while sliding the outer heat-insulating sheet-metal pipe around the outside of the turbocharger inlet, and welding the sheet metal tube to the turbocharger casting.

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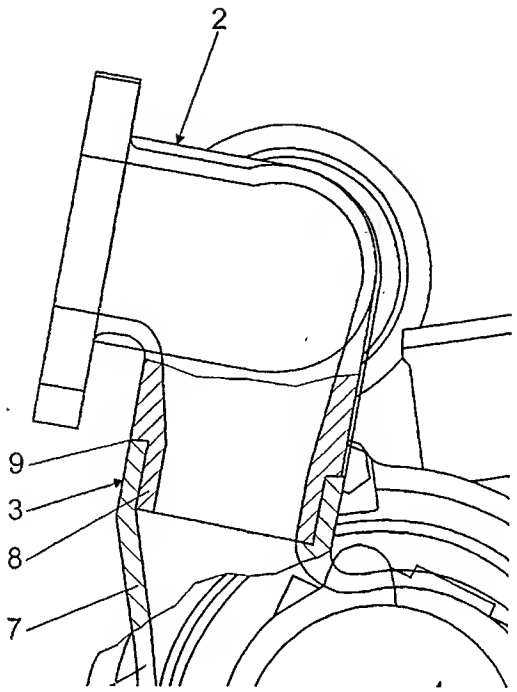

As per claim 22 use of laser welding is conventional, see AAPA. As per claims 23 and 24 MIG and TIG welding is conventional in the applied patents. Use of preheating as per claim 25 is common in the art and hence obvious to one of ordinary skill in the art. As per claim 26 the welded parts are naturally cooled, no mention made of specific cooling scheme in the claim. The article of claims 27 obviously occurs with the method steps taught.

Applicants respectfully traverse.

The claims do not simply claim a method of welding sheet metal to cast iron. Rather, the claims are directed to a novel method for economically joining an exhaust pipe to a turbocharger whereby the weight and cost of joining by bolting or v-banding together two cast metal flanges is avoided. The claims are directed to a novel method of joining an exhaust pipe to a cast metal inlet port (12) of a housing (13) of a turbocharger, and to the joined product formed thereby.

More specifically, the connection is formed between an airgap-insulated exhaust manifold (3) and an inlet port (12) of a housing (13) of a turbocharger. The airgap-insulated exhaust manifold (3) has an has an inner pipe (7), which is a gas-carrying pipe (7) of the exhaust manifold (3), and an outer pipe (9), the outer pipe (9) being manufactured from at least one sheet metal component. To form the joint,

- the outer shell (9) of the airgap-insulated exhaust manifold (3) is slid over the outside of the turbocharger opening (12) while introducing the inner pipe (7) into the port (12) of the housing (13) of the turbocharger, such that the turbocharger inlet port opening (12) is located between the inner gas-carrying pipe (7) and outer sheet-metal heat-insulating pipe (9) of the airgap-insulated exhaust manifold (3) (see Fig. 1 reproduced on page 4 above), and then
- the at least one sheet metal outer pipe (9) and the inlet port (12) are joined by means of a pulse-welding method.

This "sandwich" structure if the welded junction increases the rigidity of the connection as compared to the prior art, all of which at best discloses two tubes being inserted inside of the opening.

None of the prior art shows a turbocharger welded together with an exhaust manifold, which makes sense only in accordance with the present invention as currently defined because the outer pipe of the manifold is of sheet metal. In fact, if the manifold were made of cast iron as in the past, welding together would not be advantageous, because if the (cheap) manifold becomes defective, the (expensive) welded turbocharger cannot be separated therefrom!

In contrast, in accordance with the present claimed structure, if the sheet metal manifold becomes defective, it can easily be separated from the turbocharger housing and a new exhaust pipe welded to the turbocharger housing.

Thus, a sheet metal manifold gives the possibility to use a welding connection, which is of course advantageous compared to a flange connection, (considering, weight, price etc.).

Withdrawal of the rejection is respectfully requested.

Should further issues remain prior to allowance, the Examiner is respectfully requested to contact the undersigned at the indicated telephone number.

The Commissioner is hereby authorized to charge any fees which may be required at any time during the prosecution of this application without specific authorization, or credit any overpayment, to Deposit Account Number 16-0877.

Respectfully submitted,

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